

Application No.: 10/623,059  
Amendment dated: April 19, 2006  
Reply to Office Action of October 19, 2005  
Attorney Docket No.: 21295.54 (H5638US)

This listing of claims will replace all prior versions and listings of claims in this application:

a.) Listing of Claims

1. (Currently Amended) A method for automatic determination of optical parameters of a layer stack, such as layer thicknesses, refractive indices, or absorption coefficients, comprising the steps of:

- acquiring obtaining an acquired optical measured spectrum at one location of the layer stack and selecting tabulated acquired spectrum curve shape parameters;
- calculating an analysis spectrum on the basis of specified optical parameter values to obtain a calculated analysis spectrum and tabulated calculated spectrum curve shape parameters;
- comparing the acquired optical spectrum curve shape parameters to the calculated analysis spectrum curve shape parameters;
- optimizing the calculated analysis spectrum to the acquired optical measured spectrum;
- selecting a match between the acquired spectrum curve shape parameters and the calculated spectrum curve shape parameters;
- calculating associated analysis spectrum or spectra corresponding to selected optical parameters corresponding to the match;
- classifying the acquired measured spectrum on the basis of curve shape parameters that characterize the measured spectrum and are determined therefrom; and
- comparing these curve shape parameters to corresponding spectrum curve shape parameters calculated for known layer stacks in order to determine determining values or value ranges for the optical parameters of the layer stack by comparing to be identified, on the basis of which the calculated

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associated analysis spectrum or spectra for comparison with the acquired optical measured spectrum. ~~is/are calculated.~~

2. (Currently Amended) The method as defined in Claim 1, wherein tabulated acquired spectrum curve shape parameters comprise the acquired measured spectrum is classified on the basis of one or more of the following curve shape parameters: local noise of the spectrum; mean of the spectrum; standard deviation of the mean; number and location of the extremes; ~~a classification of the extremes, e.g. as to spectral location;~~ intensity values or relative distances spacings between them; features of enveloping curves of the minima and maxima; an averaged curve profile; beats; and parameters from the Fourier transformed curves of the acquired measured spectrum, such as the a number, location, and values of the extremes present in a Fourier transformation of the acquired optical measured spectrum. ~~therein.~~
3. (Currently Amended) The method as defined in Claim 1, further comprising restricting wherein in order to restrict the value ranges for the optical parameters to be determined, ~~an evaluation of by evaluating the acquired optical measured spectrum is additionally accomplished, depending on the type of layer stack,~~ in accordance with an extremes method and/or a Fourier transform method.
4. (Currently Amended) The method as defined in Claim 1, wherein the optimization comparing the characteristic acquired spectrum curve shape parameters to the calculated spectrum curve shape parameters of the calculated analysis spectrum to the measured spectrum is performed by means of known coarse and fine fitting methods.
5. (Canceled)

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6. (Currently Amended) A method for automatic determination of the composition sequence of a layer stack, comprising the steps of:

- obtaining an acquired optical measured spectrum from a location in the layer stack and selecting tabulated acquired spectrum curve shape parameters;
- obtaining one or more spectra of known layer stack composition and determining tabulated corresponding curve shape parameters of the known layer stack;
- comparing the acquired spectrum curve shape parameters to the tabulated corresponding curve shape parameters;
- classifying the measured spectrum on the basis of curve shape parameters that characterize the measured spectrum and are determined therefrom, and
- identifying one or more possible composition sequences of the layer stack from the comparison step.

7. (Currently Amended) The method as defined in Claim 6, further comprising determining value ranges for optical parameters wherein simultaneously with the identification step of the composition of the layer stack from the comparison to curve shape parameters of the classified spectra, value ranges are determined for the further optical parameters to be identified.

8. (Currently Amended) The method as defined in Claim 7 6, further comprising calculating an analysis spectrum wherein on the basis of the identified composition sequence of the layer stack and the value ranges for as well as any further optical parameter values, analysis spectra are calculated and are optimized and comparing analysis spectrum curve shape parameters to the tabulated acquired spectrum curve shape parameters acquired spectra.

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9. (Currently Amended) The method as defined in Claim 6, wherein further comprising inspecting the identified composition sequence of the layer stack, as well as any the value ranges for further identified optical parameters, are subjected to an inspection before the automatic determination of optical parameters of the layer stack by comparing those curve shape parameters to corresponding spectrum curve shape parameters calculated for known layer stacks, on the basis of the determined optical parameter the analysis spectrum or spectra for comparison with the measured spectrum is/are calculated.
10. (Currently Amended) A computer-readable medium comprising a program having program code means, the computer program carrying carries out the steps:
  - acquiring obtaining an acquired optical measured spectrum at one location of the layer stack and selecting tabulated acquired spectrum curve shape parameters;
  - calculating an analysis spectrum on the basis of specified optical parameter values to obtain a calculated analysis spectrum and tabulated calculated spectrum curve shape parameters;
  - comparing the acquired optical spectrum curve shape parameters to the calculated analysis spectrum curve shape parameters;
  - optimizing the calculated analysis spectrum to the acquired optical measured spectrum;
  - selecting a match between the acquired spectrum curve shape parameters and the calculated spectrum curve shape parameters;
  - calculating associated analysis spectrum or spectra corresponding to selected optical parameters corresponding to the match;
  - classifying the acquired measured spectrum on the basis of curve shape parameters that characterize the measured spectrum and are determined therefrom, - and

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- comparing those curve shape parameters to corresponding spectrum curve shape parameters calculated for known layer stacks in order to determine determining values or value ranges for the optical parameters of the layer stack by comparing to be identified, on the basis of which the calculated associated analysis spectrum or spectra for comparison with the acquired optical measured spectrum is/are calculated.

when the computer program is executed executable on a computer or a corresponding computation unit.

11. (Currently Amended) A computer-readable medium comprising the computer program as defined in Claim 10, wherein tabulated acquired spectrum curve shape parameters comprise the acquired measured spectrum is classified on the basis of one or more of the following curve shape parameters: local noise of the spectrum; mean of the spectrum; standard deviation of the mean; number and location of the extremes; a classification of the extremes, e.g. as to spectral location; intensity values or relative distances spacings between them; features of enveloping curves of the minima and maxima; an averaged curve profile; beats; and parameters from the Fourier transformed curves of the acquired measured spectrum, such as the a number, location, and values of the extremes present in a Fourier transformation of the acquired optical measured spectrum. therein.
12. (Currently Amended) The computer program as defined in Claim 10 ~~11~~, further comprising restricting wherein in order to restrict the value ranges for the optical parameters to be determined, an evaluation of by evaluating the acquired optical measured spectrum is additionally accomplished, depending on the type of layer stack, in accordance with an extremes method and/or a Fourier transform method.

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13. (Currently Amended) The computer program as defined in Claim 10, wherein ~~the optimization comparing the characteristic acquired spectrum curve shape parameters to the calculated spectrum curve shape parameters of the calculated analysis spectrum to the measured spectrum~~ is performed by means of known coarse and fine fitting methods.
14. (Canceled)
15. (Canceled)